

on to a classification of mankind and his ancestral and recent history as revealed by fossil and other remains, from the Tertiary period to the present day. Subsequent chapters deal with comparative anatomy and physiology, psychology and sociology, while the last quarter of the book is devoted to the less studied, or perhaps less popular, topic of comparative pathology and therapeutics. To compress so vast a subject within the limits of a small volume has led to all descriptions being of the briefest. None the less, the book will appeal to those who desire to acquire a superficial knowledge of the main features of human evolution, while the sections will serve as starting-points for further study to those more deeply interested, and be of considerable assistance to popular lecturers, who will find therein a dense array of facts.

The introduction comprises a summary of the surmises made in the past as to the origin of man, and leads up to the study of evolution. The history of the systematic classification of mankind into races unexpectedly ends with Huxley and Max Müller, more recent authors being omitted. The section on comparative anatomy is full and freely illustrated, but is marred, at any rate for the general reader, by a tendency to give the names of the parts referred to in Latin in the text, and in the illustrations to label them sometimes in English, at others in Latin, while in some cases abbreviations only are made use of. This is the more to be regretted as the names employed are not always those found in English text-books of anatomy. Space being valuable, it may be wondered why long tables of chemical compositions, such as that of the brain, which occupies a whole page, were included. It seems at times as if the author was uncertain whether he was writing for the student or the general public. The sections on early man are too short for the former in comparison with the rest, while the number of unexplained technical terms must prove a stumbling-block to the latter. Indeed, in many respects the volume suggests a very full and illustrated syllabus of a course of lectures rather than a text-book or a popular description.

Regarded in this light, the book would be a useful aid to students of human or comparative anatomy and physiology. Perhaps the most interesting, because most unusual, chapter in a work of this kind is that dealing with pathology, which contains much that would otherwise have to be garnered with considerable labour, since the data are scattered through a multitude of technical journals. The author shows that in general the phenomena of disease in man, whether due to animal or vegetable parasites or to disorders of metabolism, are similar to those presented by the higher animals, the differences being largely explicable by such features as the assumption of the erect attitude, the habits of feeding, and more particularly by the aggregation into large communities, the often unhygienic methods of clothing, and the abandonment of free physical exercise which has characterised the recent history of man.

PRACTICAL PHYSICS.

(1) *Practical Physics*. By L. M. Jones. Pp. viii+330. (London: Longmans, Green and Co., 1909.) Price 3s.

(2) *Handbuch für physikalische Schülerübungen*. By Prof. Hermann Hahn. Pp. xv+506. (Berlin: Julius Springer, 1909.) Price 20 marks.

(1) **O** PINIONS will always vary as to the precise means to be adopted to achieve any definite end, and this is notably the case in the teaching of practical physics, as is shown by the many text-books on the subject. It is the more to be remarked that most teachers will readily subscribe to the thesis which Mr. Jones lays down, perhaps a little combatively, in the preface to his book, as to the fundamental idea of practical courses of physics. All students will agree that practice must illustrate and substantiate theory in a connected, logical manner, so that a "course" may review the fundamental conceptions of the subject, and, in so doing, train the reasoning power. Several text-books, however, might be conceived as conforming to this canon.

But Mr. Jones has that best of qualifications—of having actually used his course for several years, and proved it by success. The title of the book is slightly misleading, as the book only treats of heat, light, and electricity. Within these limits we have little but praise for it. The explanations of theory are lucid, and give an orderly, interesting, and withal simple conspectus of fundamental conceptions founded upon an extremely complete series of nearly 200 experiments. The illustrations are attractive and not too complex, and the instructions as clear as could be desired. Practical exercises at the end of chapters give scope for that element of initiative which is necessary to approximate students' work to the conditions of research, and the general revision papers at the end of the book afford a useful method of eliciting the physical conceptions learned.

The list of experiments covers such subjects as vapour pressure, dispersion, and electrolysis, which are not commonly included in "intermediate" courses, while simple methods of electrification, the electroscope, and electrophorus are omitted which are usually included. In spite of this, and a relegation of instruction as to probable errors to notes which might have been better treated in an introduction, the book is always stimulating, suggestive, and clear.

(2) The "*Handbuch*" of Prof. Hermann Hahn is a book of a totally different character. It offers a clear, eminently logical, and complete course of practical physics, with all that the term usually signifies, to teachers. It is a book which one can freely praise and blame with difficulty. Commencing with conceptions of space and mass, it covers very completely general properties of matter. Indeed, nearly half the book is devoted to this part of the subject, but we can hardly regret it. Incidentally, we find the student is to be introduced, at the outset, to his apparatus of calculation—an excellent idea. The slide rule comes on p. 5, and a student is early to be taught habits

of accuracy and means of attaining them with sufficient rapidity to keep them in their place of subserviency to the theory of the experiments. Another excellent point is the treatment of vibration and waves in general.

Prof. Hahn has a firm and broad grip of what has been accomplished on his own subject, not only by his fellow-countrymen, but by students of other nations. A bibliography at the head of each section contains almost all the well-known names among English, French, and American physicists. On p. 3, at the head of Section 2, we find Prof. Perry's excellent book on "Practical Mathematics" noted, and this fact is a significant specimen of the method in which the subject has been approached. A full bibliography at the end of the book contains even such references as the Board of Education syllabuses.

H. C. O'N.

OUR BOOK SHELF.

School Algebra. By W. E. Paterson. Part i., pp. 328+xxxix. Part ii., pp. 333-604+xli-lxxvii. (Oxford: Clarendon Press, 1909.) Price 3s. each with answers; 2s. 6d. each without.

PART I. is, except as regards one or two things, sufficient for students who are not going to specialise in mathematics, and part ii. contains the higher portions which are usually read by scholarship pupils. The author has, however, reserved the ordinary methods of finding the H.C.F. of two expressions and of extracting square roots until part ii., whereas in many cases these methods are taught in preparatory schools. In part i. he has shown the student how to obtain square roots by means of indeterminate coefficients, so that the postponement of the formal method is not a very serious drawback; moreover, the teacher can introduce it if he likes without difficulty, as boys readily learn it. But with regard to H.C.F. the case is different. If the author had, in part i., shown pupils that the H.C.F. is contained in the sum or difference of any multiples of the two given expressions, he would have put a powerful weapon into their hands, quite sufficient for all ordinary cases; but practically all he says is that both expressions must be factorised, the remainder theorem being used for cubic and higher expressions. Graphs are well treated, except that in the diagrams the author omits the minus signs on the negative side of the axes. There are a great many misprints and other inaccuracies, chiefly in part i., some of which are serious; for example, the rule given in Art. 80 (p. 113) is quite wrong as it stands, and even if corrected would be difficult to understand, and would be, moreover, of only partial application.

On the other hand, some of the hints are excellent, as, for example, that it is no use to try to factorise ax^2+bx+c by inspection if b^2-4ac is not a square number (p. 212), a good foreshadowing of the value of the theory.

Part ii. is well done, though in some instances explanations are too condensed; the distinction between permutations and combinations, for instance, is not well explained. But, as a rule, proofs are clear as well as concise, and many important examples are worked out in a very instructive manner.

There is a good index to each part, and a large number of examination papers, including questions in French and German. In the hands of a good teacher the book would be an excellent concise introduction

to all the parts of algebra required for scholarship work; but it would have to be supplemented in places, and it is most desirable that a careful table of errata should be provided as early as possible.

Eliza Brightwen: the Life and Thoughts of a Naturalist. Edited by W. H. Chesson, with introduction and epilogue by E. Gosse. Pp. xxxii+215; plates. (London: T. Fisher Unwin, 1909.) Price 5s. net.

ALTHOUGH in no sense a scientific naturalist—and, indeed, to a great extent ignoring the work of others—Mrs. Brightwen did good service in publishing first-hand accounts of the habits of animals—both in captivity and in the wild state—and thus helping to stay the flood of rubbishy works, compiled by those who had no real knowledge of their subject, which were only too common some twenty years ago. Perhaps the most remarkable feature in her career is the fact that her first, and apparently most successful, work, "Wild Nature Won by Kindness," was not presented to the public until its author had attained her sixtieth year. Throughout her life she had, however, devoted all her spare time to learning all that was possible about every kind of animal that came in her way, whether home or foreign, and this volume was, therefore, the result of long and close observation, and this, too, in a thorough and exhaustive manner. When it is added that this, as well as the five other volumes bearing her name, was written in a bright and attractive manner, it is little wonder that it leapt at once into popularity, and also obtained the honour of being translated into Swedish.

Mrs. Brightwen, who was a daughter of Mr. George Elder, a brother of one of the founders of the firm of Smith, Elder and Co., was born at Banff in 1830, and in the early 'seventies her husband purchased The Grove at Stanmore, where she was soon after left a widow. It was here that all her published works were written, and also much of the MS. of the volume now before us, mainly in the form of a diary, although the earlier portion dates from so far back as 1855. At her death the MS. was left to Mr. Edmund Gosse, with a free hand as to its ultimate disposal.

That he did well in deciding on its publication, under the careful editorship of Mr. Chooson, will, we venture to think, be the verdict of all those who read this charming volume, which, in addition to numberless observations on natural history, gives an instructive insight into the inner life of a striking personality.

R. L.

The Grammar of Life. By G. T. Wrench. Pp. xii +237. (London: William Heinemann, 1908.) Price 6s. net.

PHILOSOPHY is to some a liberation from the positive and dogmatic habit of mind, to others a new field for its exercise. As the title of his book indicates, Mr. Wrench belongs to the latter class. He does, indeed, profess at the beginning a philosophical phenomenalism: "We know only our own perceptions. Consciousness itself depends on previous perceptions; for without memorised perceptions with which to compare our present perceptions, consciousness would not exist." From this quotation it is evident that the infinite series, that nightmare of so many philosophies, has no terrors for Mr. Wrench. But, though without apparent misgiving on this head, he is only verbally constant to his sceptical presupposition. His "relativity" gives us such cardinal propositions as these:—"Man has no ultimate purpose"; "life is a special form of matter in motion"; "the universe is an eternal series of cycles." It is legitimate for a philo-